COLLEGE OF ARTS, HUMANITIES & SOCIAL SCIENCES
THE UNIVERSITY OF ALABAMA IN HUNTSVILLE

Research and Creative Experience for Undergraduates Program (RCEU)
Summer 2015

The Roles of Fluency, Working Memory, and Pressure in Math Anxiety and Math Performance

Hillary Erwin, Psychology Department

Overview

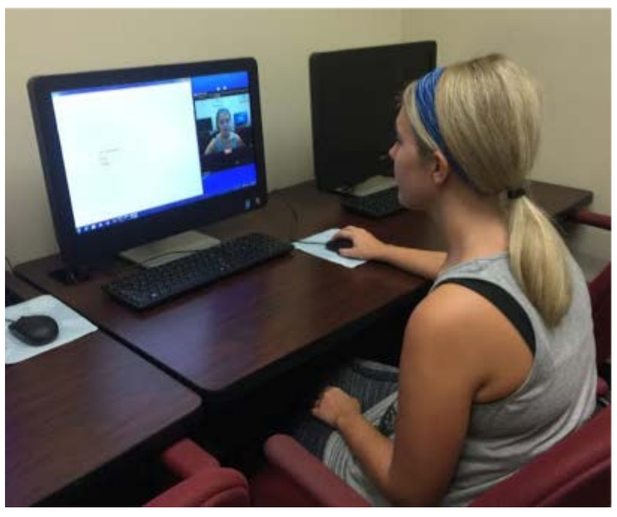
- Math anxiety may hinder performance, even for those high in math ability, by disrupting working memory (Maloney, Sattizahn, & Beilock, 2014).
- Fluency of items affects perceptions of difficulty, with fluent items perceived as easier to learn than disfluent items (Oppenheimer, 2008).
- The present study examined whether presenting problems that appear easier would interact with the actual difficulty level of problems to affect students' problem solving performance in low and high pressure testing conditions.

Method

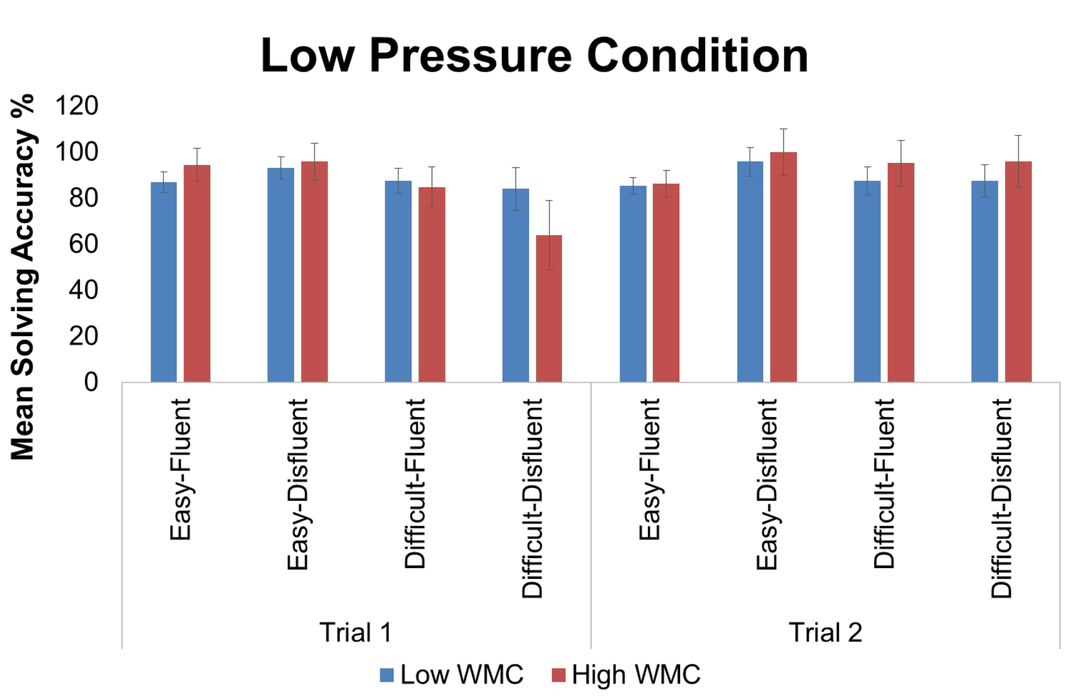
- 2 x 2 x 2 x 2 x 2 (Trial by Working Memory by Problem Difficulty by Pressure by Fluency)
- Between Subjects: Working Memory (WMC), and Pressure
- Within Subjects: Trial, Problem Difficulty, Fluency
- Participants: *N* = 33 run to date.

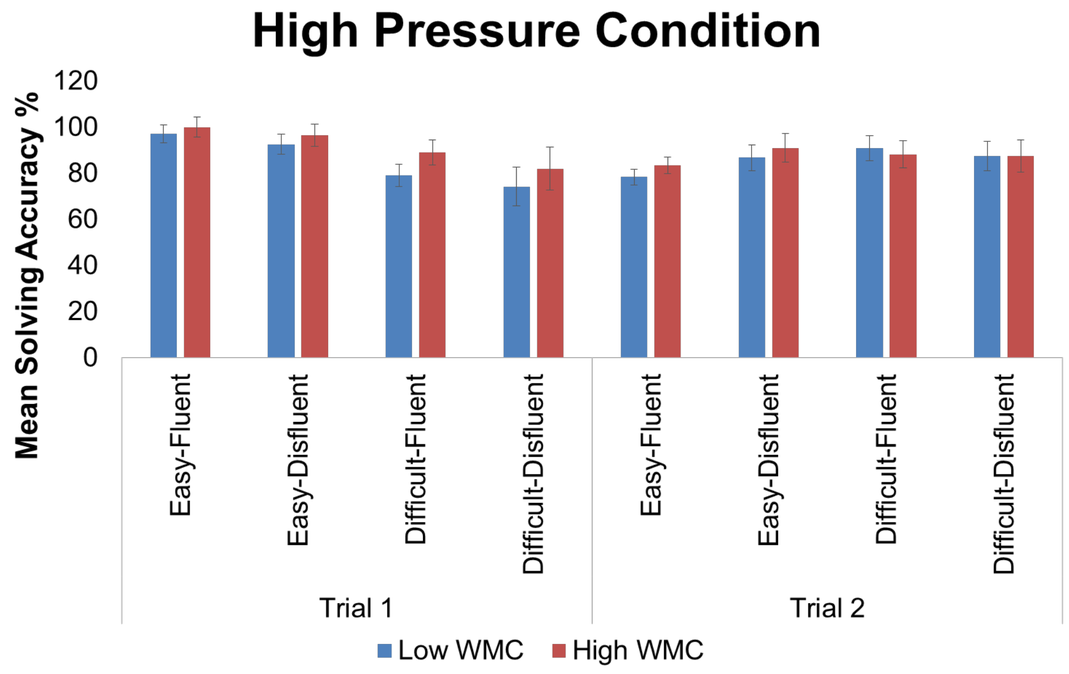
Modular Arithmetic Stimuli

	True/Fluent	True/Disfluent	False/Fluent	False/Disfluent
Easy Problems (Low WM)	9=6 (mod 3)	8=2 (mod 3)	3=2 (mod 2)	9=1 (mod 3)
	2=1 (mod 1)	7=2 (mod 5)	9=1 (mod 3)	4=1 (mod 2)
	3=2 (mod 1)	3=1 (mod 2)	3=1 (mod 3)	5=1 (mod 3)
	4=2 (mod 2)	4=1 (mod 3)	4=2 (mod 4)	4=3 (mod 2)
	5=3 (mod 1)	5=2 (mod 3)	5=3 (mod 3)	5=3 (mod 4)
	True/Fluent	**True/Disfluent**	**False/Fluent**	**False/Disfluent**
Difficult Problems (High WM)	10=5 (mod 5)	17=9 (mod 4)	10=2 (mod 10)	17=9 (mod 5)
	25=5 (mod 2)	26=11 (mod 3)	25=2 (mod 2)	26=11 (mod 4)
	33=30 (mod 3)	37=16 (mod 7)	33=13 (mod 3)	37=16 (mod 4)
	44=22 (mod 2)	43=18 (mod 5)	44=14 (mod 4)	43=18 (mod 8)
	50=10 (mod 5)	51=19 (mod 4)	50=15 (mod 15)	51=19 (mod 7)



Results





Conclusions

- In general, problem solving accuracy was higher for those with higher WMC than for those with lower WMC.
- Actual problem difficulty and the fluency of each problem interacted to influence problem solving accuracy.
- Additional analyses will focus on whether students' self-reported math anxiety affected performance.

References

Maloney, E. A., Sattizahn, J. R., & Beilock, S. L. (2014). Anxiety and cognition. *Wires Cognitive Science*, *5*(4), 403-411.

Oppenheimer, D. M. (2008). The secret life of fluency. Trends in Cognitive Science, 12, *237-241.*

Acknowledgements

I would like to acknowledge my faculty mentor, Dr. Jodi Price, and her graduate student, Victoria Blakely, for their assistance with this project. I also thank the UAH Office of the Provost, UAH Office of the Vice President for Research and Economic Development and the Alabama Space Grant Consortium for funding the RCEU Program.